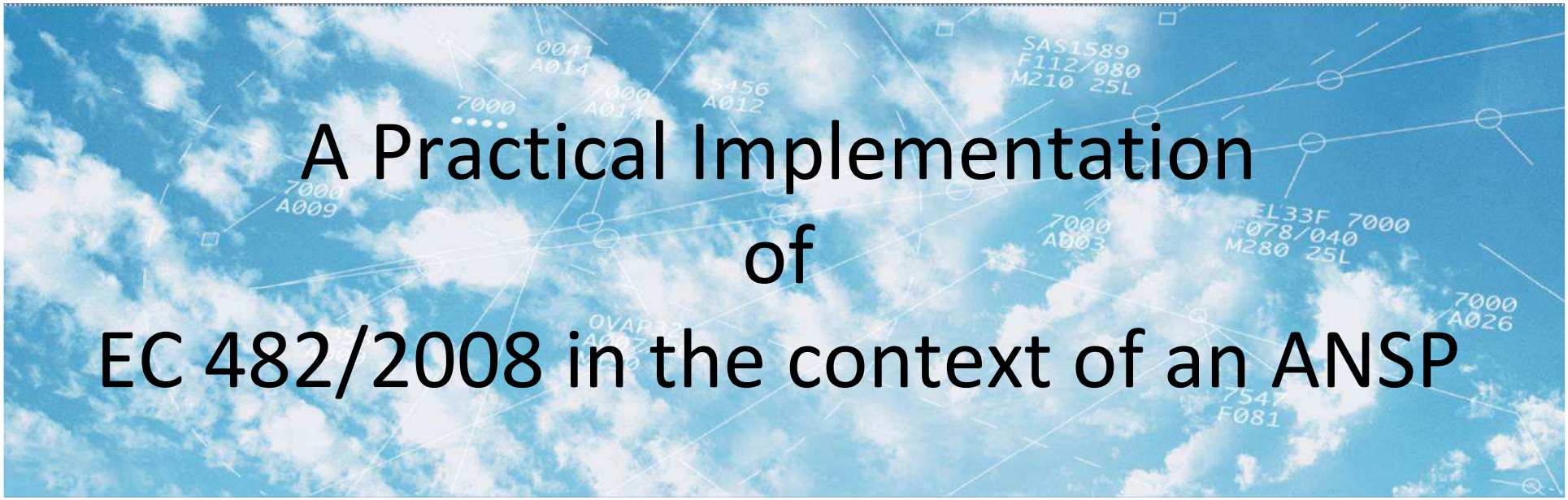

A Practical Implementation of EC 482/2008 in the context of an ANSP

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Belgocontrol

- Plan of the presentation

1. Introduction
2. How to consider Software in the context of an ANSP ?
3. ANSP Structure
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8. Relationship with the Regulator
9. Opened Questions
10. Any Questions ?

Introduction

- The aim of this presentation is to :
  - Demistify Software
  - Consider it at the right place in the equipment
  - Take Care of it with the adequate consideration

- - We will consider in the context of our ANSP, BELGOCONTROL:
  - The technical approach
  - The safety approach
  - How to match those complementary approaches

Remember !

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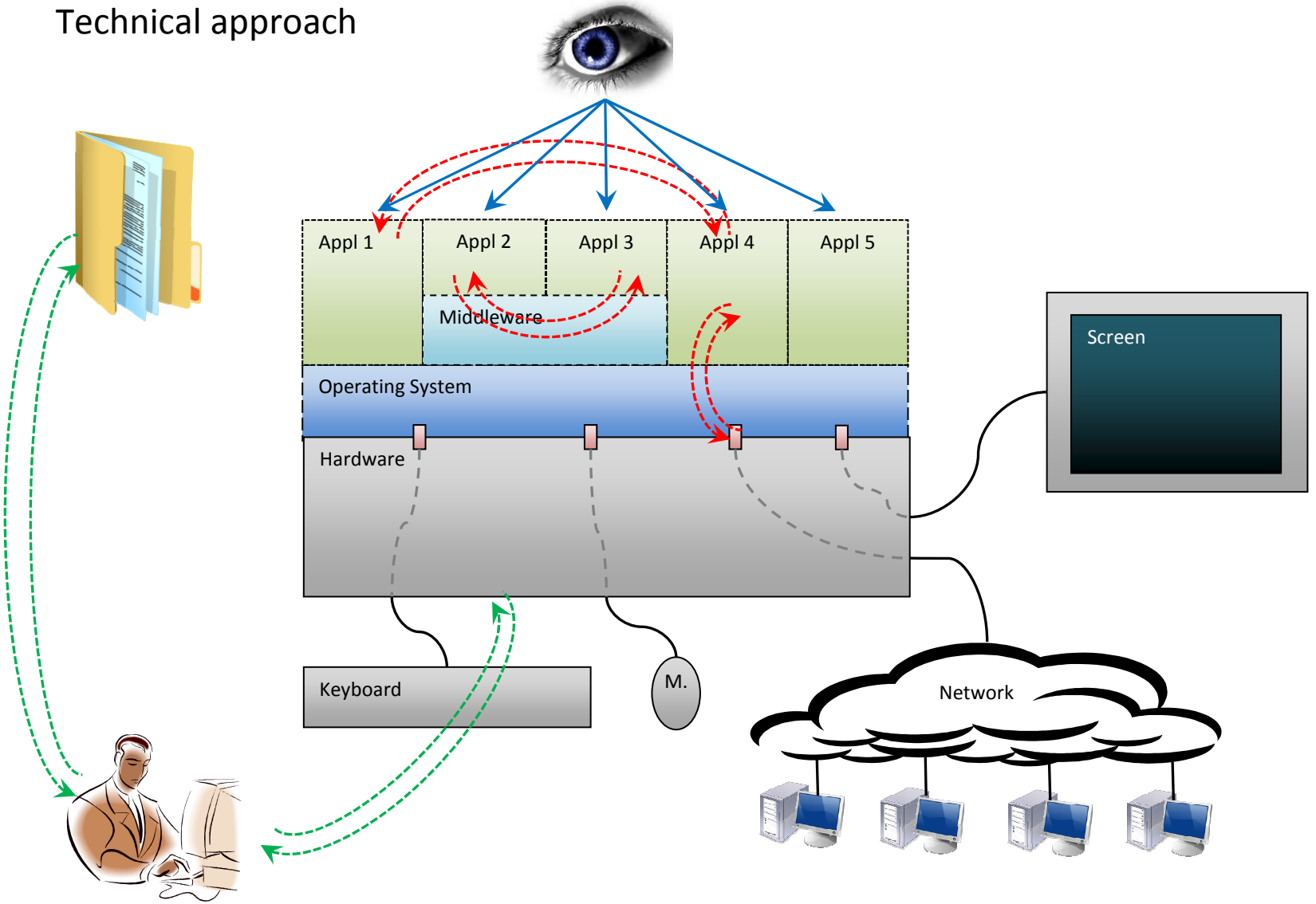
How to consider Software in an ANSP ?

- Technical approach



How to consider Software in an ANSP ?

- Technical approach

  - Software is an intangible part of the equipment.

  - Software is not really measurable, quantifiable but its contribution to the behaviour of the equipment is.

  - Software is a Versatile way to change the behaviour of the equipment.

  - Versatility is :

    - A strenght.

    - A huge weakness.

  - Engineering defines working methods to cope with the versatility in order to achieve:

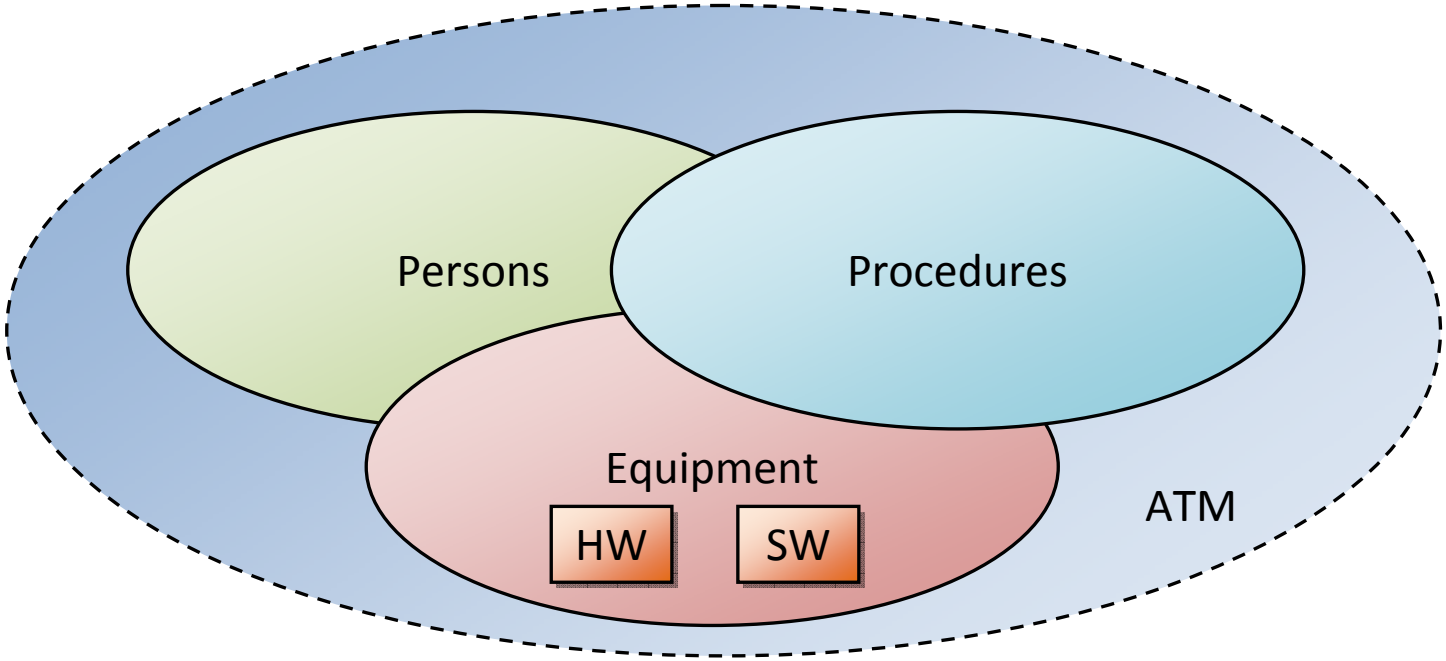
    - Goals to be fullfilled by the software.

    - Reduce as much as possible unwanted behaviour.

Technical approach often neglects functional approach

How to consider Software in an ANSP ?

- Safety approach



How to consider Software in an ANSP ?

- Safety approach

  - Software is an equipment constituant contributing in the realization of functions within a context

  - Due to its nature, software reproduces exactly the same behaviour in the same circumstances. Software is causal: When it fails to fullfill a function for a specific reason, it is always in the same way.

  - Software is a versatile way to change the behaviour of an equipment. To avoid this to become a weakness, any change must be done in a controlled way

- How to have the assurance of a controlled production of software ?

  - Via a quality process with measurable assurance level

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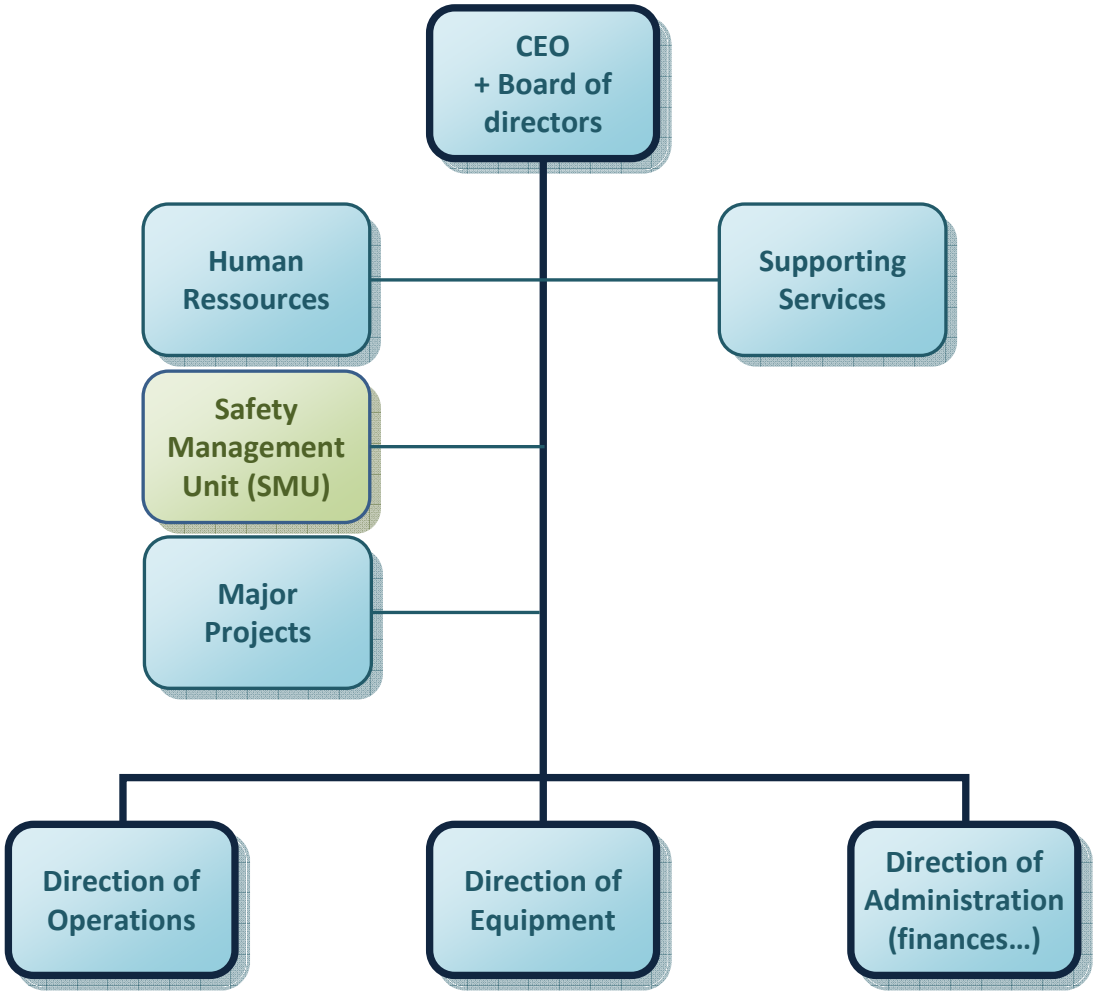
ANSP Structure



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Understanding Regulation EC-482/2008 in a real world context

- Is an extension of EC1035/2011 (System approach)

- Software Safety Assurance System is a part of System Safety Assurance

- Whatever the change, an ANSP is required to implement a risk assessment and mitigation process (EC 1035/2011)

- EC 482/2008 describes what is required for software specific aspects of the changes. It has to be seen as some kind of pluggin to the safety assurance system

- By change, we understand corrections, modifications and projects

Understanding Regulation EC-482/2008 in a real world context

- Regulation requires :

. To establish a software safety assurance system

. To allocate adequate SWAL for a change

. To produce evidence for supporting arguments

. Requirement correctness, satisfation and traceability

. To know your software version (documentation included) => Configuration management + documentation process

. To manage the risks linked to unintended functions => it does not mean they should not exist, but at least controlled

. Any change shall be notified to the NSA

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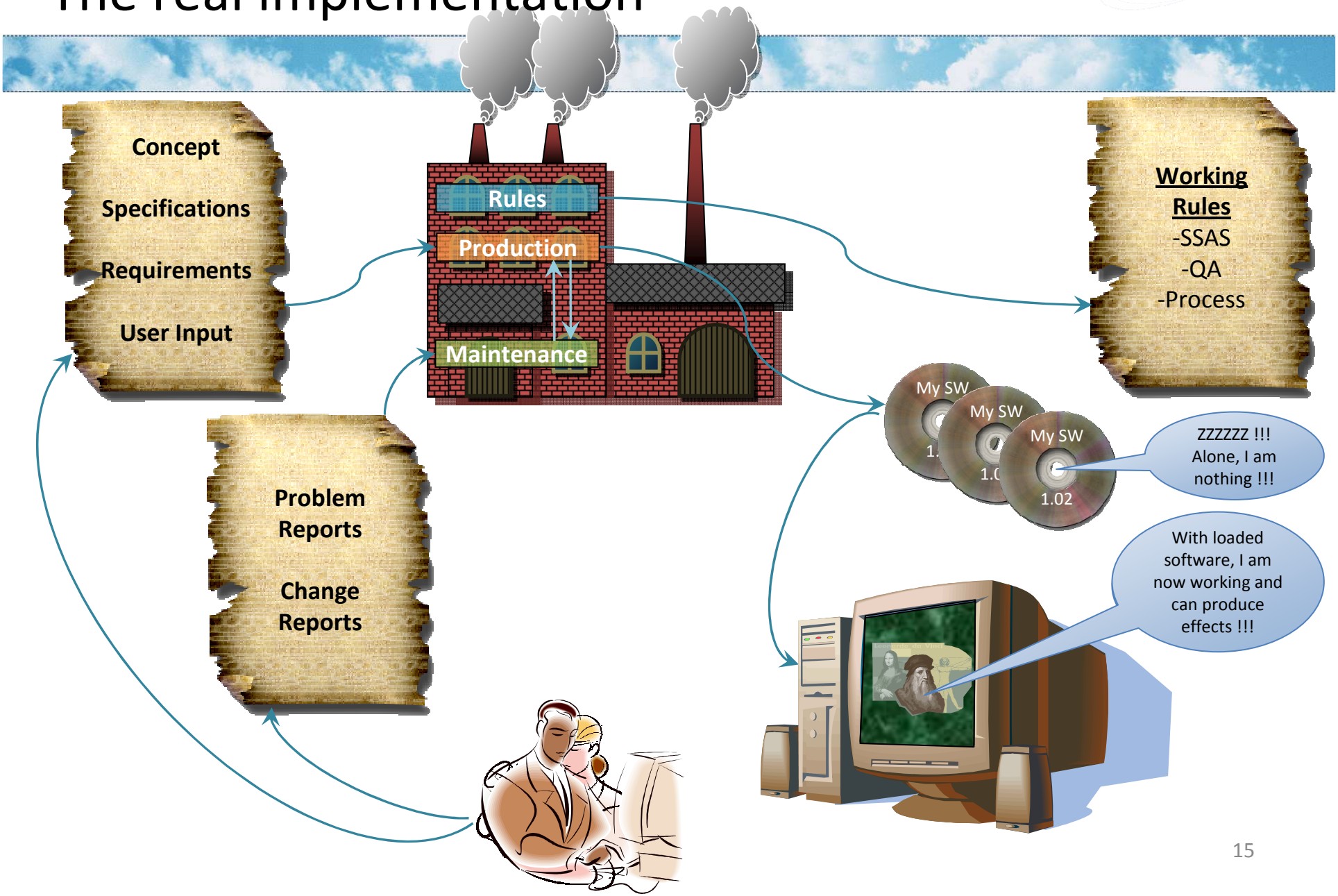
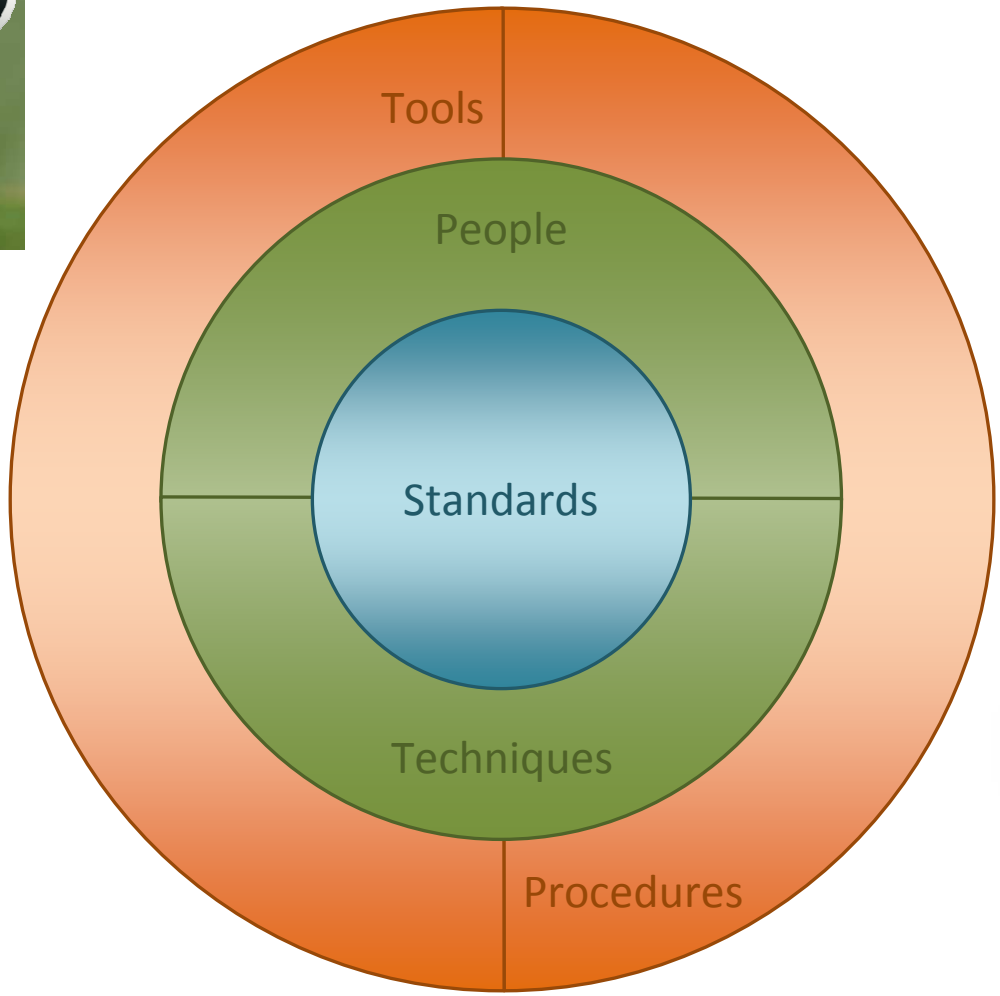
The real implementation



The real implementation – Software Production Environment

Goal



Costs

Schedules

The real implementation

- Your Software Safety Assurance System shall be realistic to be effective ! Otherwise, people will not use it.

- Your Software Safety Assurance System includes nearly all layers of the ANSP

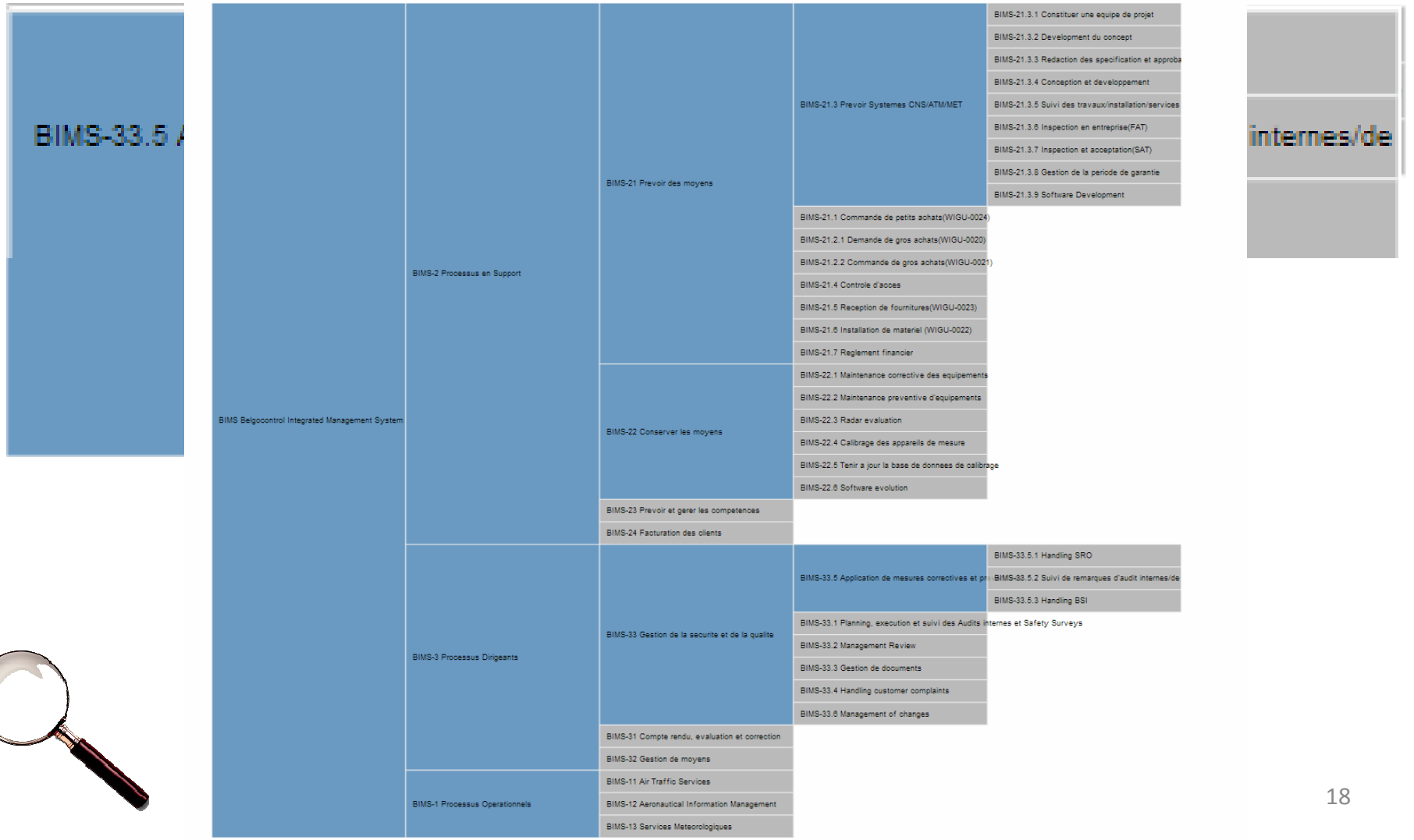
- Some of the needed processes already exist and are recurrent in change management (e.g. acquisition…), Do not re-invent the wheel !

- Software Safety Assurance has a cost that might have a heavy weight in management decision… Do not neglect it !

- Software Safety Assurance activities will not stop at the end of the change/project. Do not forget to identify maintenance activities in the long term budget planning

The real implementation

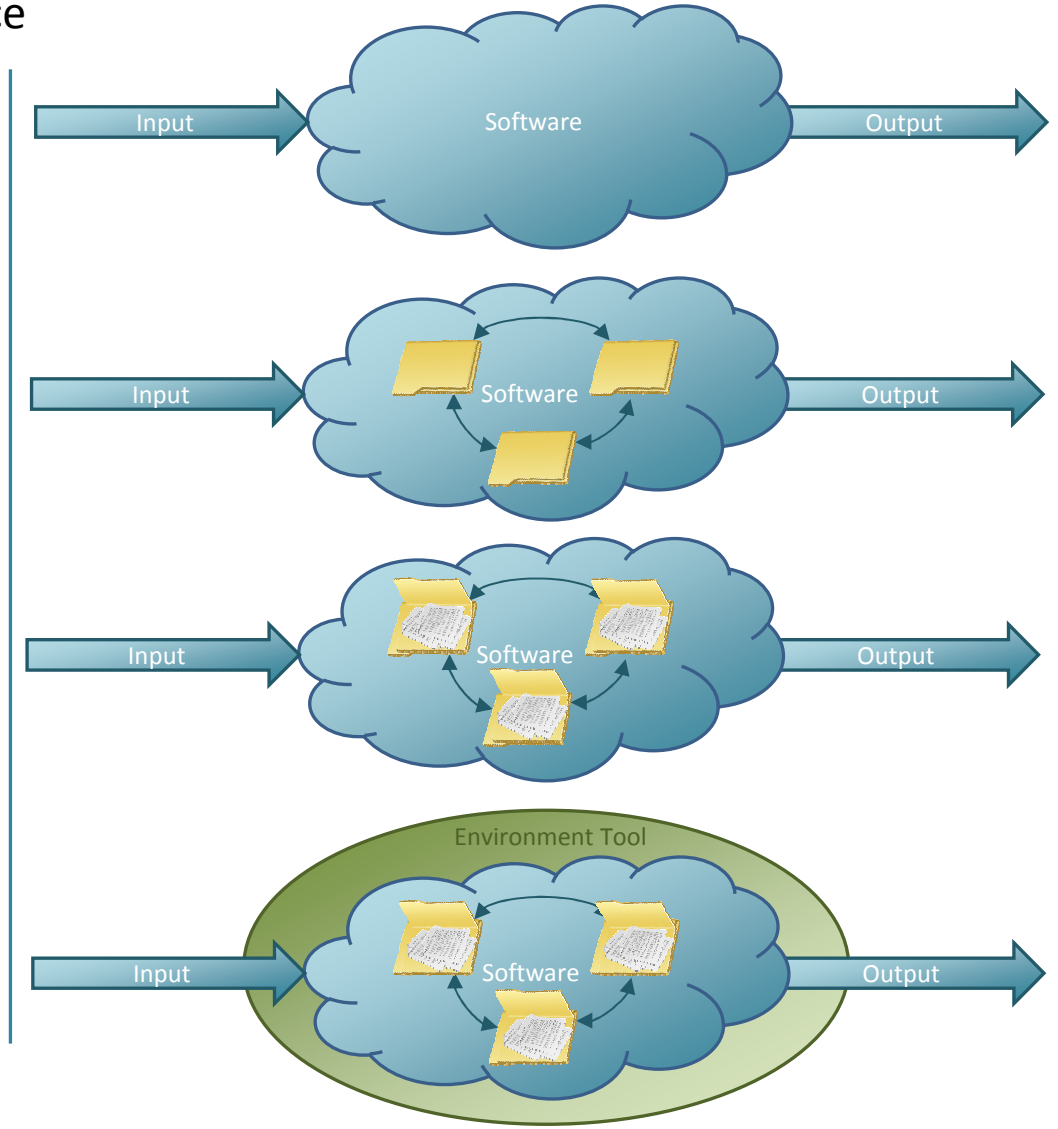
- Corporate Process



The real implementation : What the SWAL means

A Software Assurance Level

- SWAL 4
- SWAL 3
- SWAL 2
- SWAL 1



To mitigate :

- Software functional error
- Design / low level functional error
- Credible corruption until implementation (Source code level)
- Credible corruption until implementation (Executable code level)

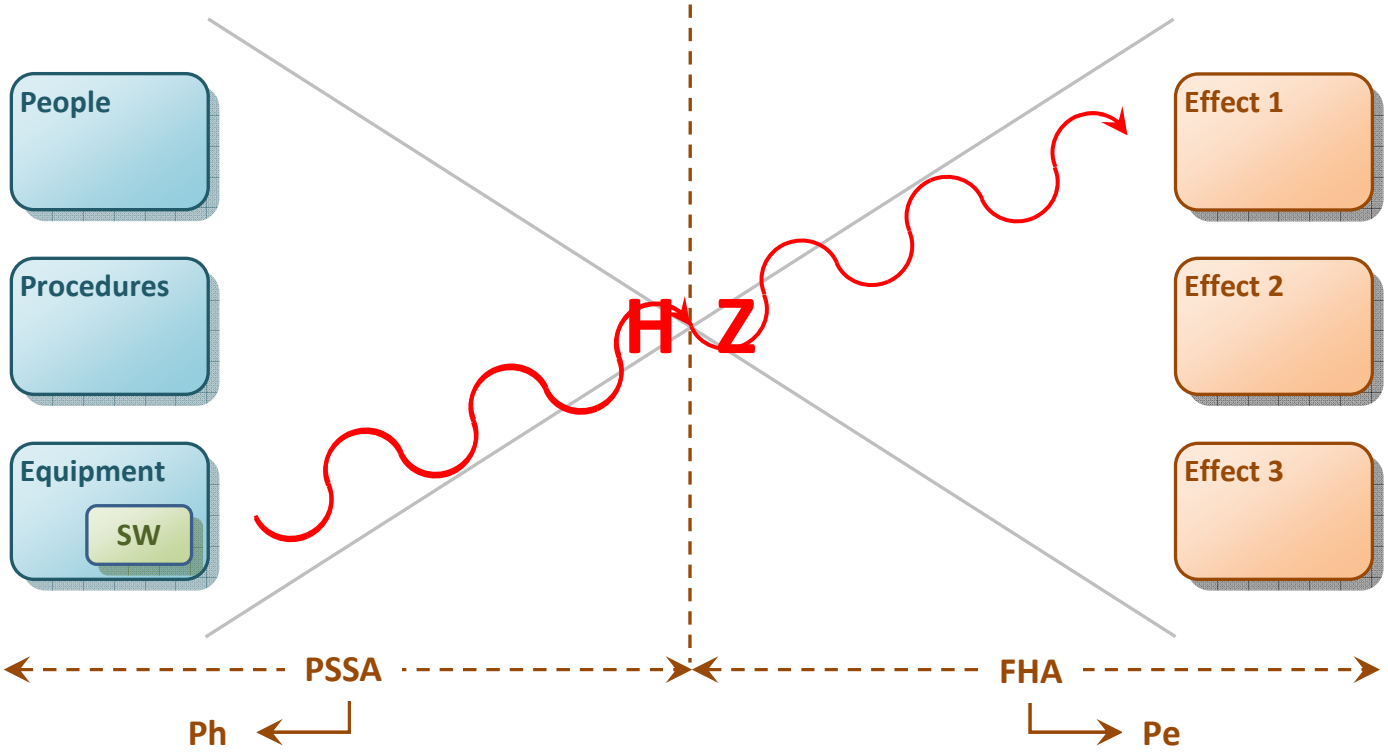
The real implementation

- Focus on results

  . Aim of a software is not being safe, it is to fulfill operational goal

  . Regulation shall be a safeguard in software practices

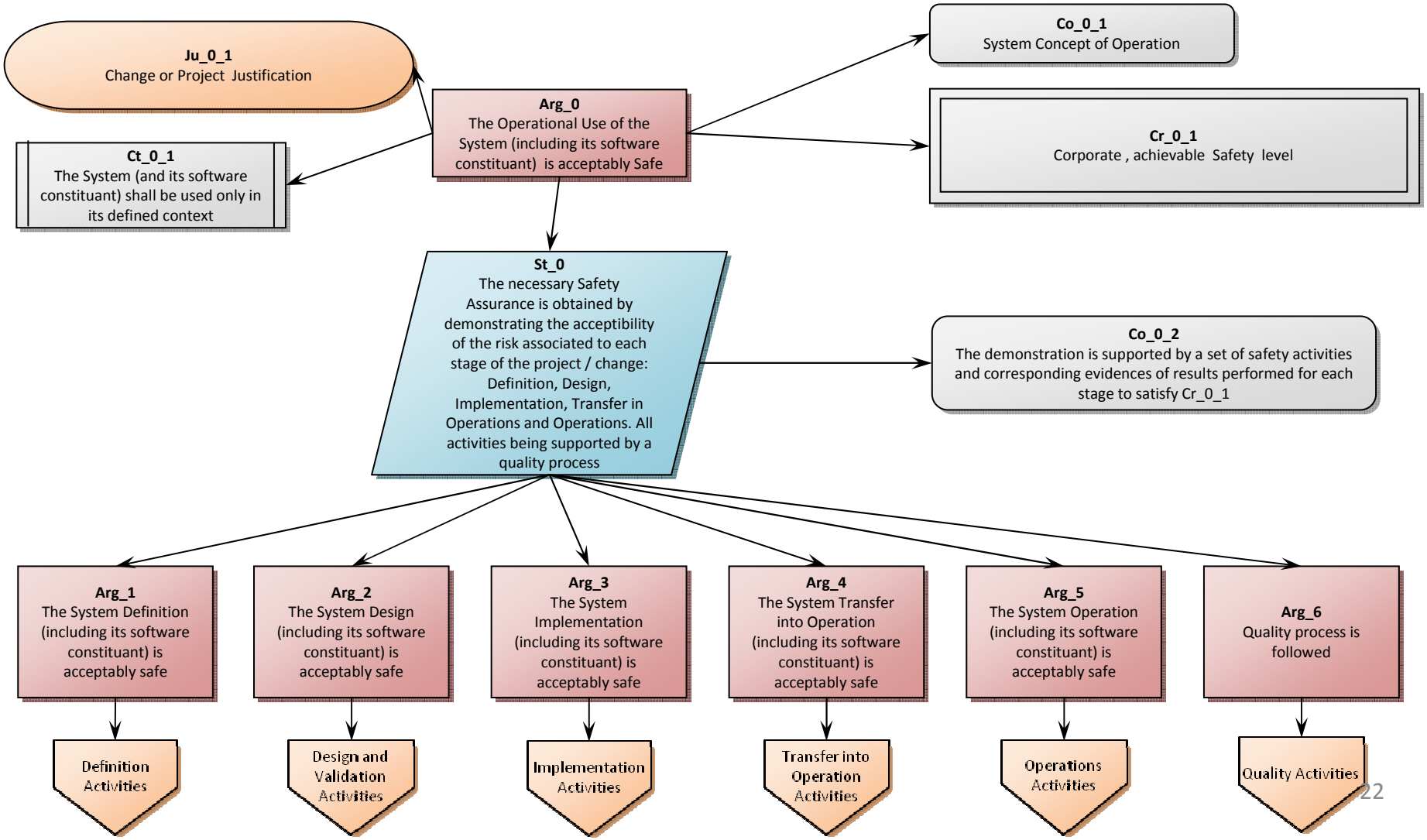
- Assign a realistic and maintainable SWAL



The real implementation

- Maintaining the SWAL as part of the maintainance process
  - . SWAL Verification (is it still valid since the last change)
  - . Change Management
  - . Version and Configuration Management
- Gather and produce evidences as outcomes of your processes
  - . SWAL Compliance Matrix
  - . Change / Project documentation
- **Software Safety Assurance shall be part of your activities…**

The real implementation



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Software Categories within an ANSP

- Bespoke Software
  - In-House
  - Sub-Contracted

  } The difference is not important. How you will be able to maintain it is the question. What can I afford?
- COTS
  - OS, specific libs, etc…
  - Unless the provider can help you to fill in your SWAL Compliance Matrix, it is a black box. Take care to the context of use (unintended functions)
- Legacy
  - Level of documentation can be low or high but rarely what is required to comply with regulation
  - Case by case solution to be found
  - Raise the question: re-engineer or replace?

In any case, SWAL 4 is the minimal level to implement.
Think your Software in its context (as part of a system) to allocate the SWAL

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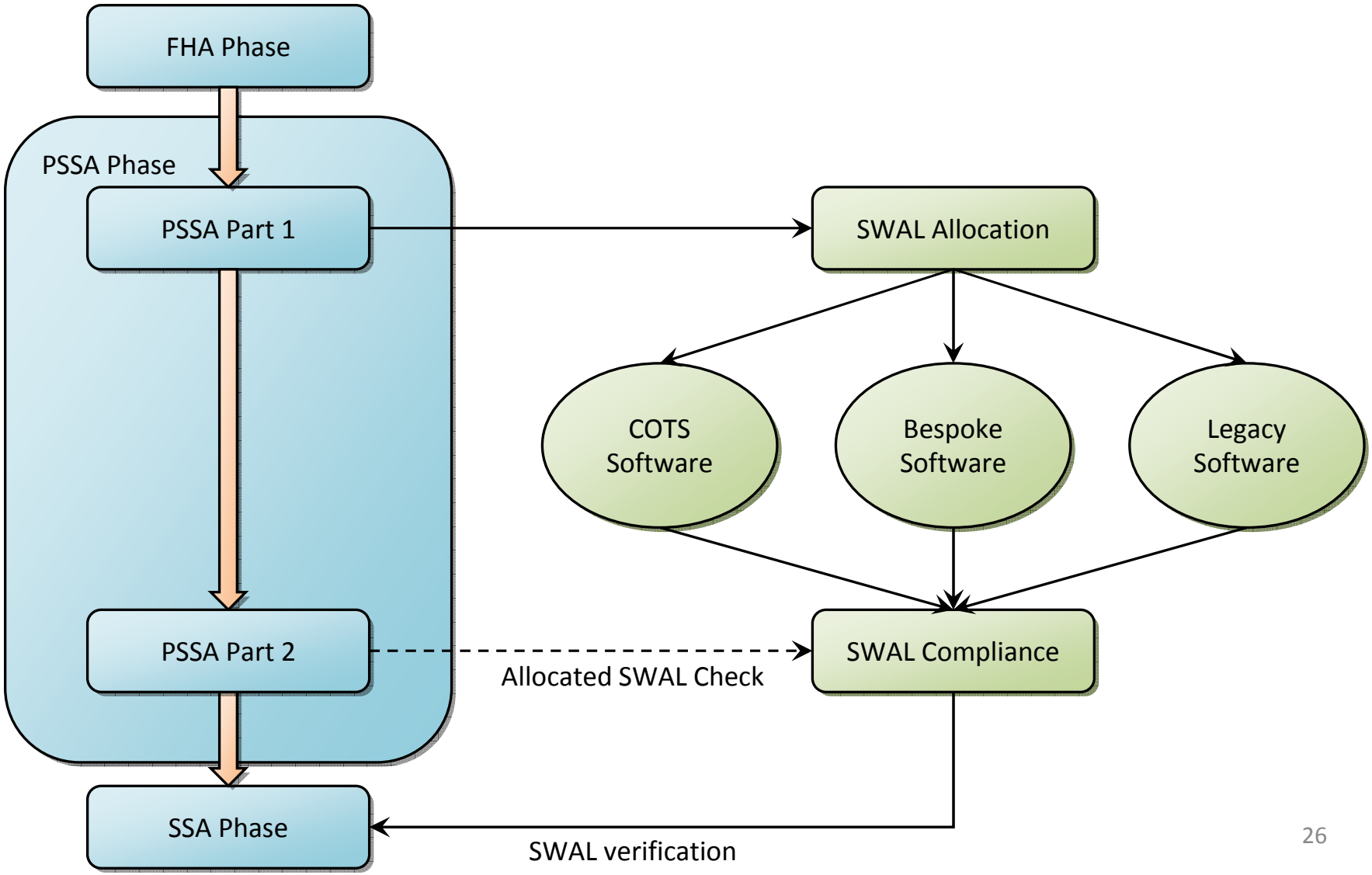
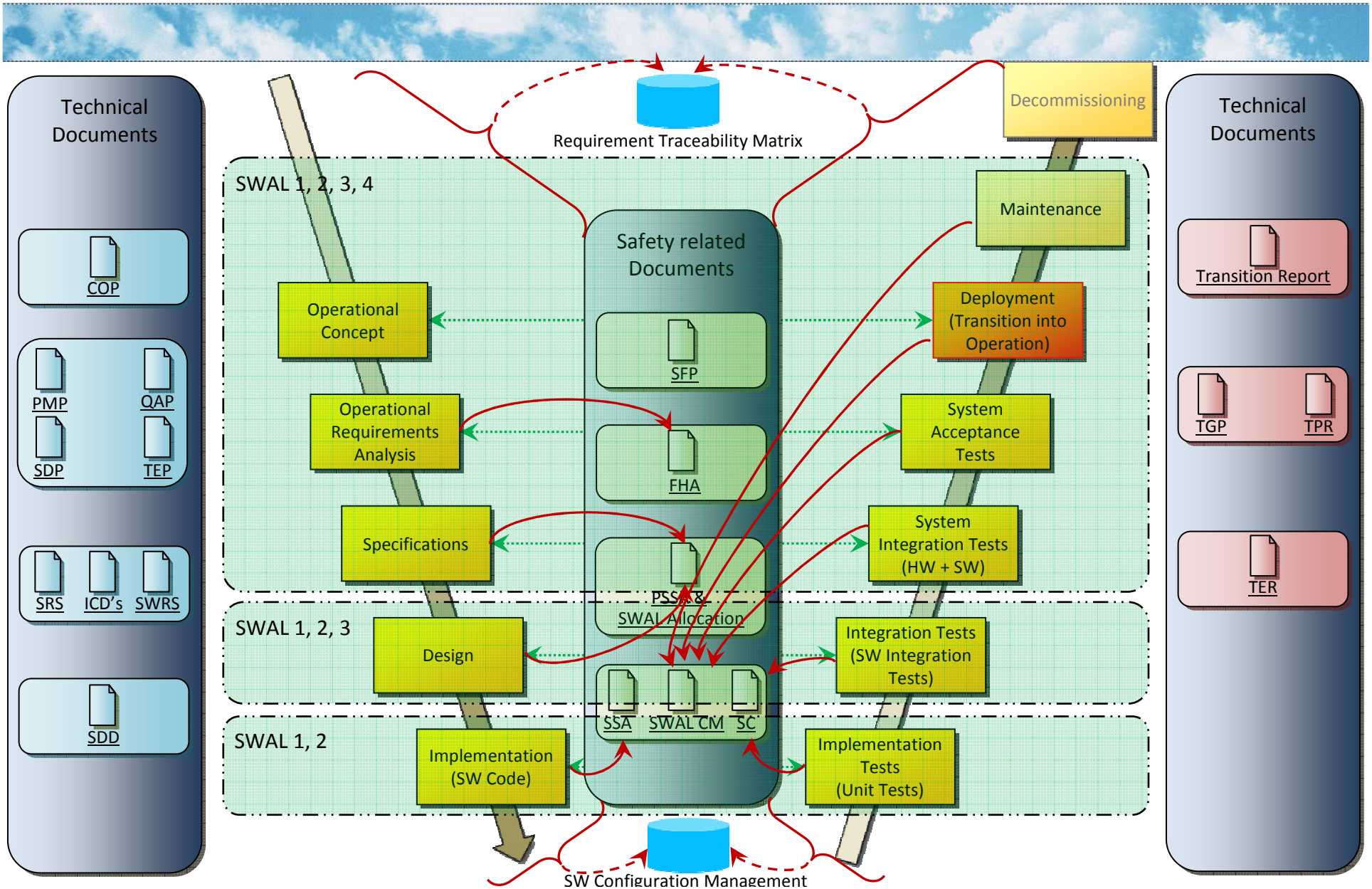
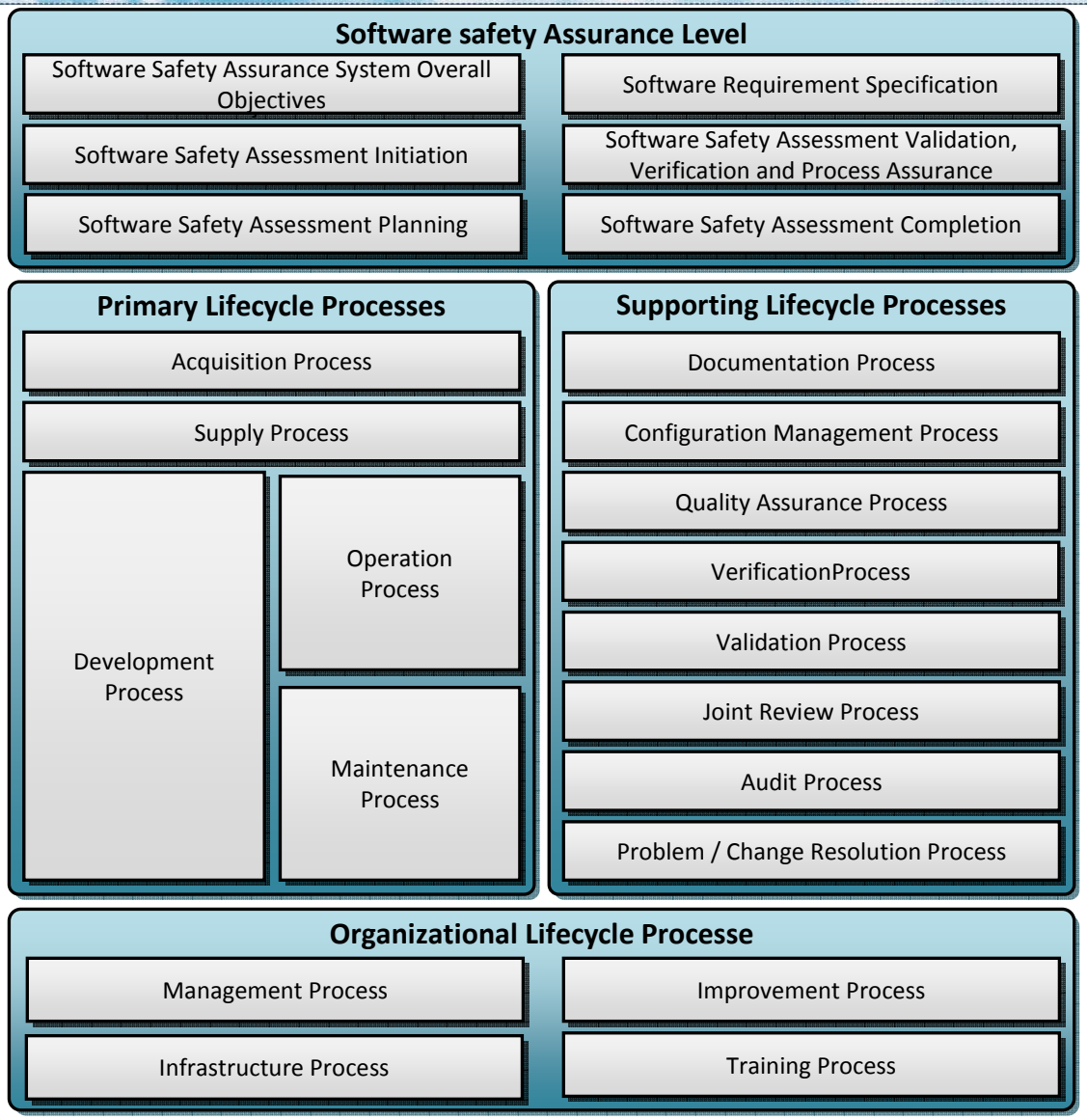
Software Lifecycle



Software Lifecycle



Software Lifecycle



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Relationship with the regulator

The Software Safety Assurance System is a specialization of the Safety Assurance System

- Define your Software policy within a manual => it allows to communicate in the ANSP and with the regulator

- For each change / project when notification is applicable, start with early notification

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Opened Questions

- To find a practical solution to make the link between safety related occurrences and software

- What to require from external suppliers (a study is in progress with NLR) ?

- What to do with legacy systems?... Update to comply with the regulation or replace?

- What about equipments with embedded software?... How to apply the regulation?

Any questions ?